OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **CANAAN STREET LAKE** the program coordinators recommend the following actions. *We would like to encourage the association to conduct more sampling events in the future. With a limited amount of data it is difficult to determine water quality trends. Since weather patterns and activity in the watershed can change throughout the summer it is a good idea to sample the lake several times over the course of the season, generally once a month from June through August.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a, also a measure of algal abundance, in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *stable* in-lake chlorophyll-a trend, although there was a large increase in the chlorophyll-a concentration this season. It is the highest the lake has ever experienced. Even though the concentration was higher than normal, the average chlorophyll-a remains below the state mean. Sampling more frequently in the summer will help to determine trends. The concentration of phytoplankton in the lake in July was very abundant and the majority consisted of the golden-brown algae *Synura* (Table 2). While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stabilizing* trend in lake transparency. The transparency this year was much lower than last year's reading. This is most likely due to the higher chlorophyll concentration. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings.

Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *slightly improving* trend for in-lake phosphorus levels, which means levels are decreasing. Epilimnetic phosphorus was only slightly above last year's results, which could be a result of the increased rain this year. The hypolimnetic average was less than the 1999 average. Phosphorus concentrations remain below the NH mean for the lake. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- **Please note** this summer the hypolimnetic phosphorus levels were found to be less than 5 µg/L. The NHDES Laboratory Services adopted a new method of analyzing total phosphorus this year and the lowest value that can be recorded is less than 5 µg/L. We would like to remind the association that a reading of 5 µg/L is still considered low for New Hampshire's waters.

- Conductivity in the lake appears to be increasing over the years (Table 6). Conductivity increases often indicate the influence of human activities on surface waters. Septic system leachate, agricultural runoff, iron deposits, and road runoff can all influence conductivity. It would be useful to determine the reasons for increased conductivity as we continue to monitor the lake. Conducting more samples throughout the summer would help to determine from where the excess pollutants are entering Canaan Street Lake. Bracketing streams will assist in pinpointing the cause of higher conductivity levels. Consider implementing a more stringent sampling program next summer. For ideas and information please contact the VLAP Coordinator at (603) 271-2658, or e-mail to vlap@des.state.nh.us.

- Total phosphorus concentrations in the Inlet were 4 times that of 1998's results (Table 8). Phosphorus has not been this high since 1994. Last year the Inlet was dry so a sample was not taken. If the Inlet had water but was stagnant this year the phosphorus results would be easy to explain. Stagnant waters concentrate nutrients and

pollutants making the results appear worse than normal. The conductivity result for the Inlet was slightly higher than in 1998 (Table 6) as was the turbidity (Table 11). This suggests that some sediment was collected in the sample bottle. Please make note of stream flow and level on the field data sheet.

- The dissolved oxygen was high at all levels of the lake this year (Table 9). As stratified lakes age, oxygen is depleted in the lower layer by the process of decomposition. The lack of this aging indicator is a sign of the lake's overall health.

USEFUL RESOURCES

Weed Watchers: An Association to Halt the Spread of Exotic Aquatic Plants, WD-BB-4, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Handle With Care: Your Guide to Preventing Water Pollution. Terrene Institute, 1991. (703) 661-1582.

What is a Watershed?, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

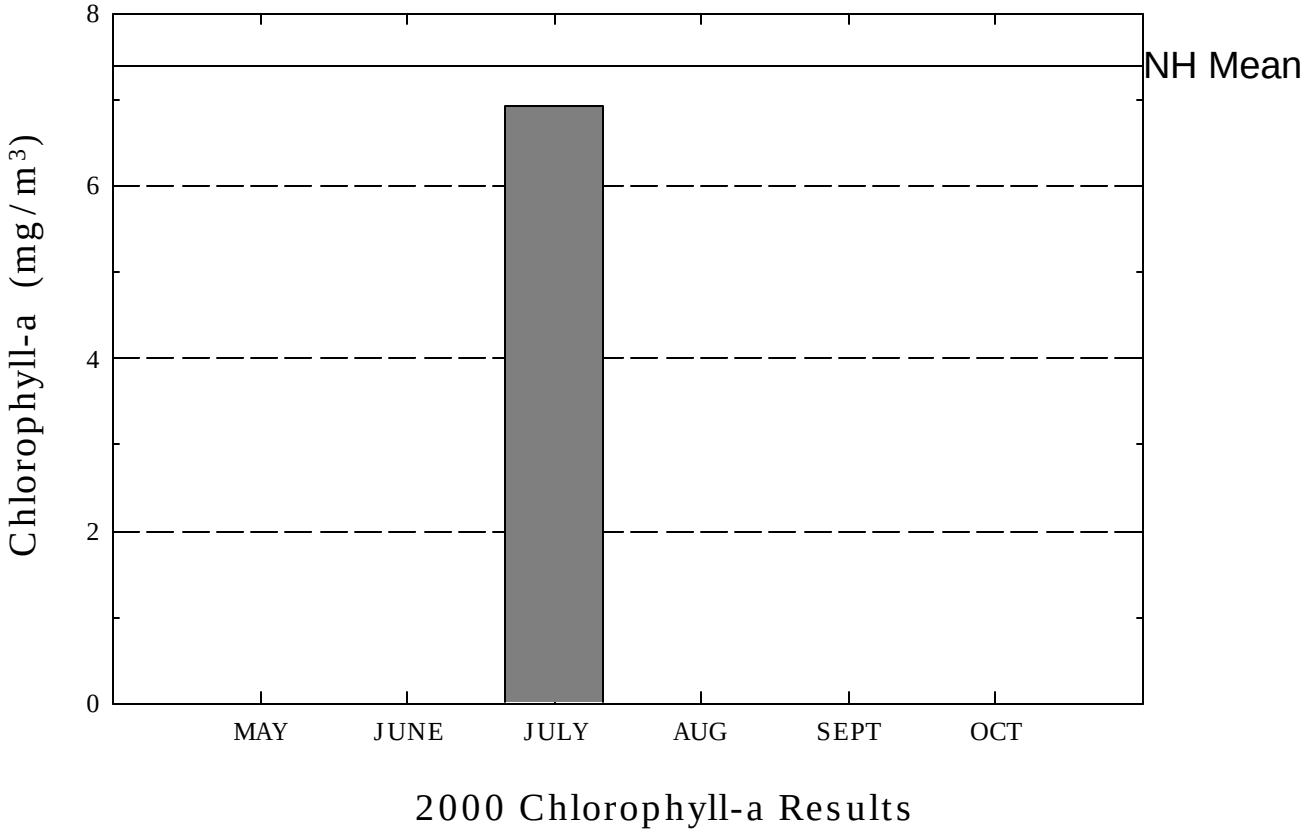
Phosphorus in Lakes, WD-BB-20, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

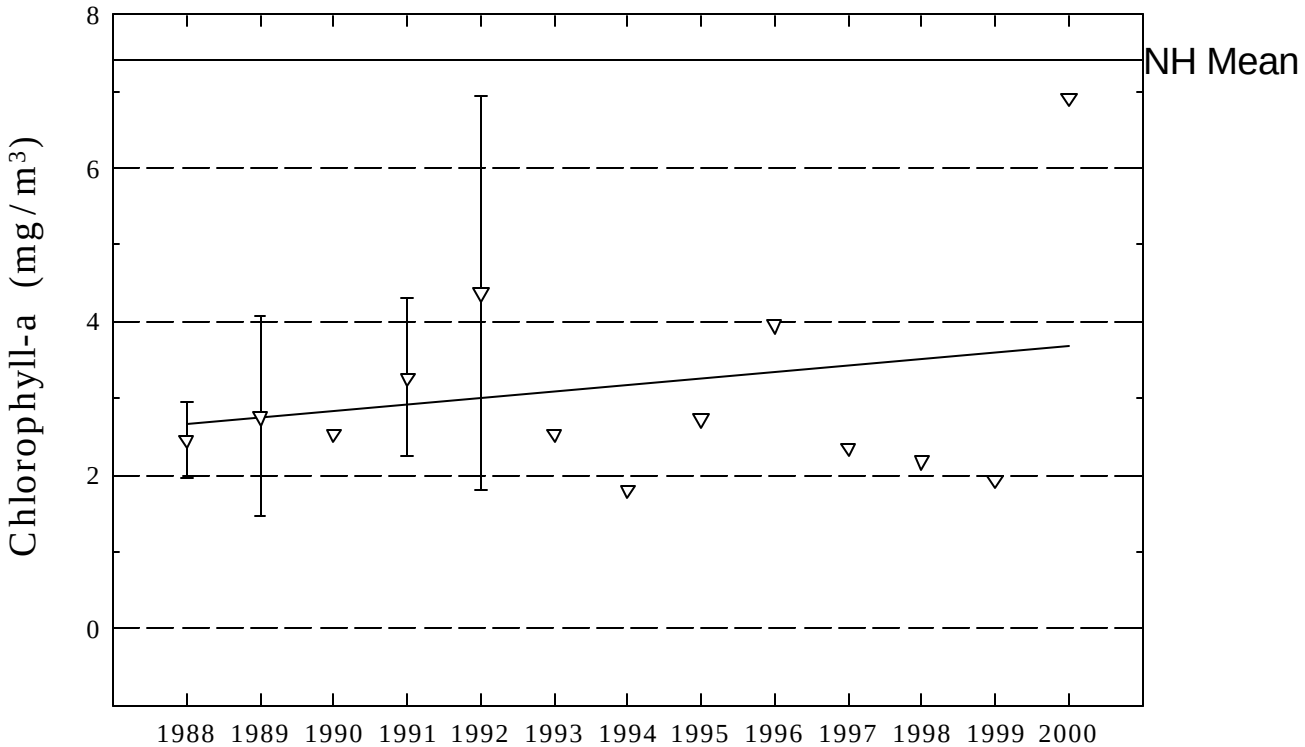
Diet for a Small Lake: A New Yorker's Guide to Lake Management. Federation of Lake Associations, Cazenovia, NY, 1990. (315) 655-4760

Canaan Street Lake

Figure 1. Monthly and Historical Chlorophyll-a Results



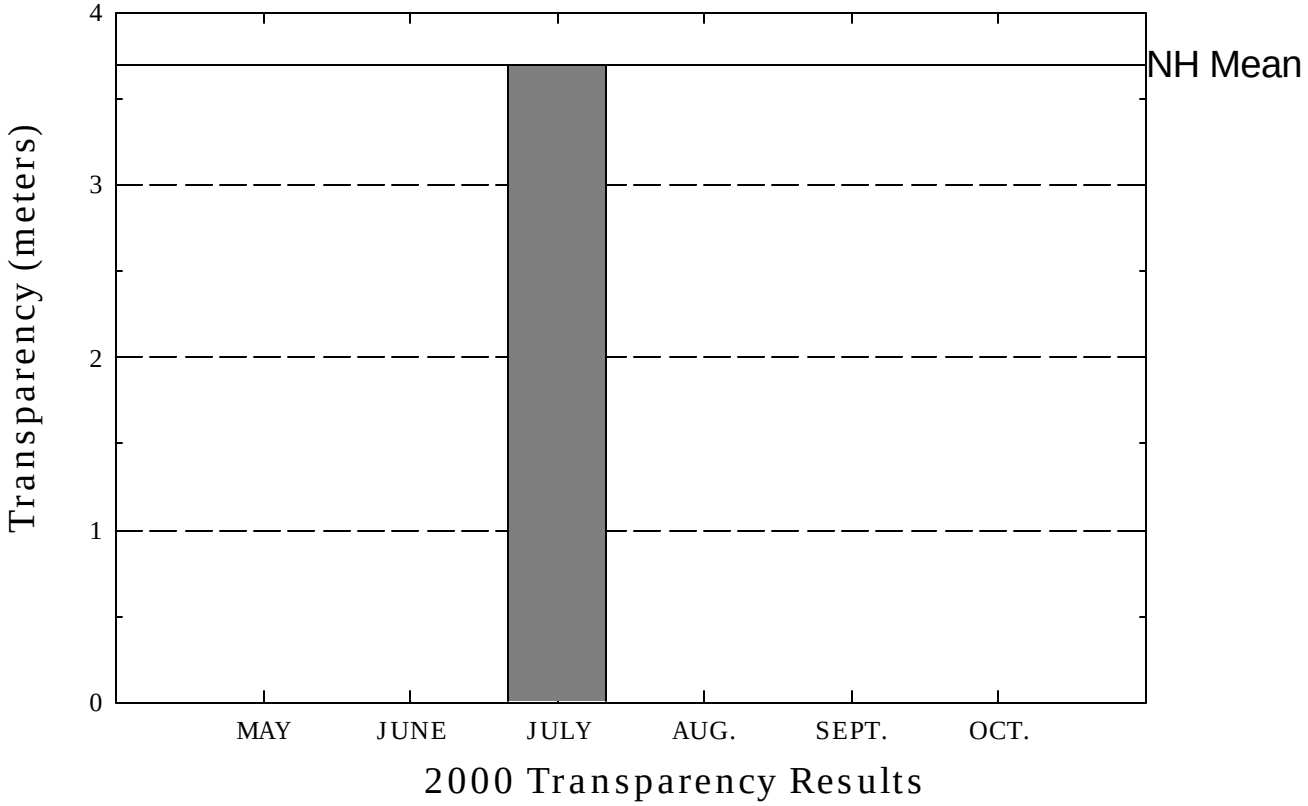
2000 Chlorophyll-a Results

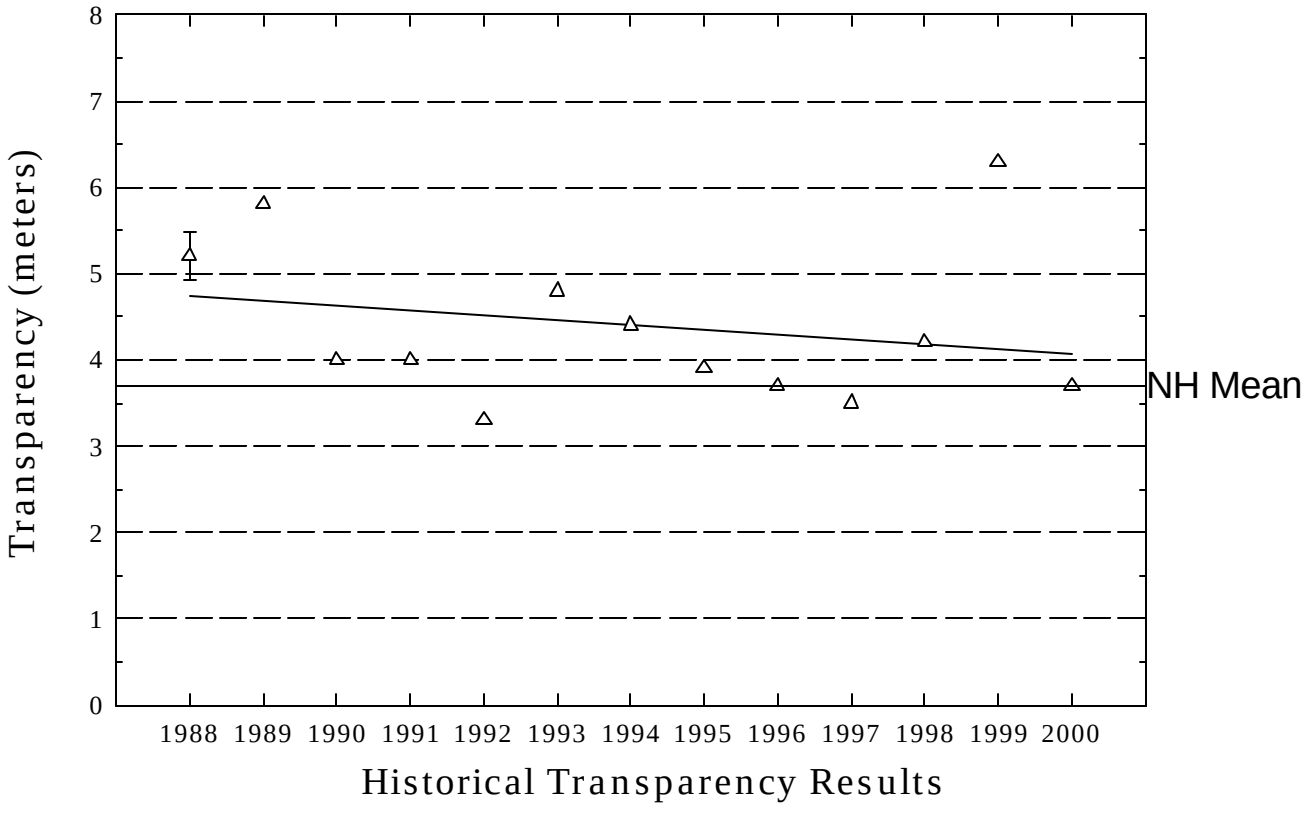


Historical Chlorophyll-a Results

Canaan Street Lake

Figure 2. Monthly and Historical Transparency Results





Canaan Street Lake

Figure 3. Monthly and Historical Total Phosphorus Data.

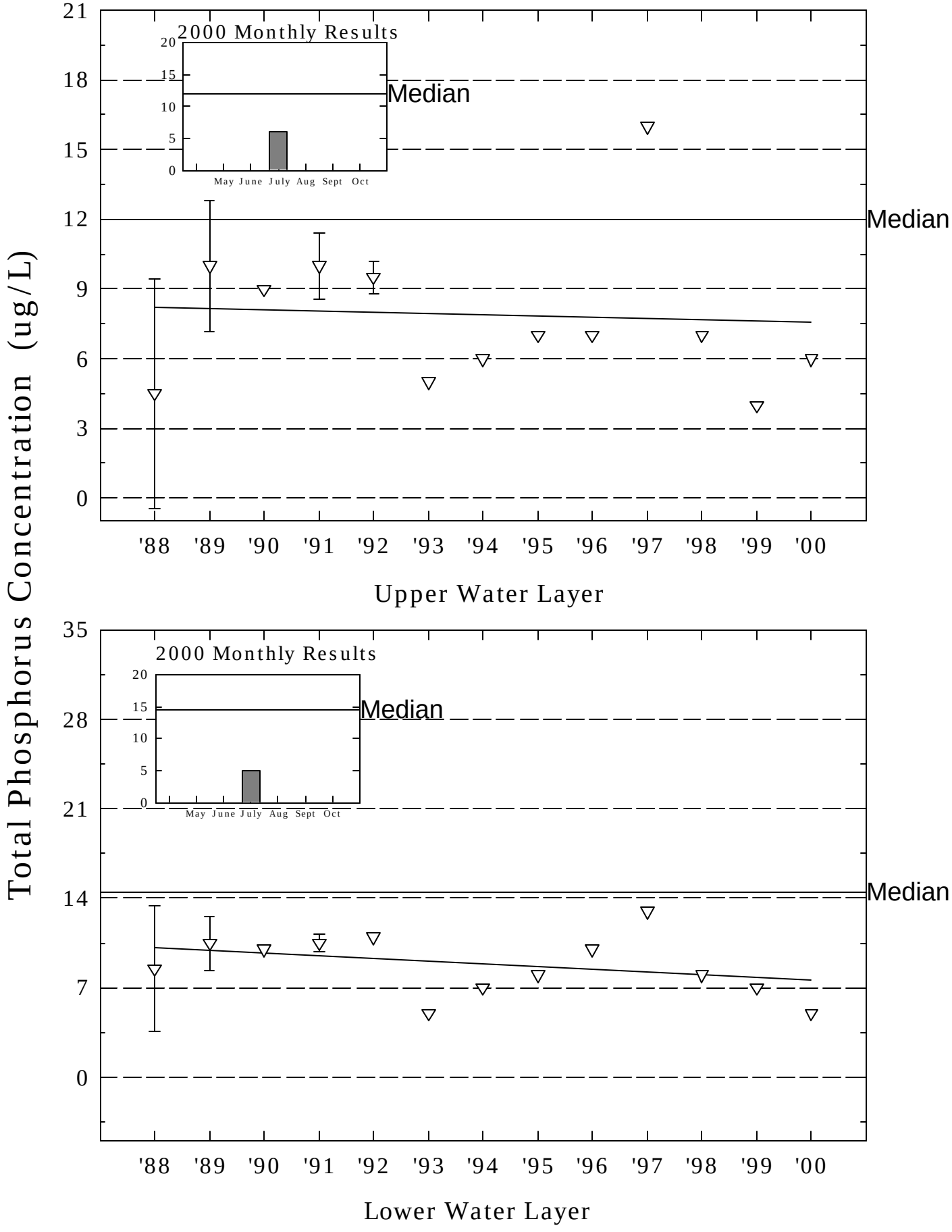


Table 1.

CANAAN STREET LAKE

CANAAN

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1988	2.10	2.81	2.45
1989	1.84	3.68	2.76
1990	2.54	2.54	2.54
1991	2.54	4.01	3.27
1992	2.56	6.19	4.37
1993	2.54	2.54	2.54
1994	1.80	1.80	1.80
1995	2.73	2.73	2.73
1996	3.96	3.96	3.96
1997	2.35	2.35	2.35
1998	2.18	2.18	2.18
1999	1.94	1.94	1.94
2000	6.92	6.92	6.92

Table 2.

CANAAN STREET LAKE

CANAAN

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07/20/1988	DINOBRYON	36
07/13/1989	ANABAENA	24
	CERATIUM	
	STAURASTRUM	
07/29/1991	DINOBRYON	45
	CERATIUM	16
	ASTERIONELLA	14
08/03/1992	ASTERIONELLA	66
	TABELLARIA	19
	ANABAENA	9
09/08/1993	DINOBRYON	60
	STAURASTRUM	15
08/10/1994	SYNURA	53
	CERATIUM	41
07/19/1995	COELOSPHAERIUM	64
	GLOEOCYSTIS	10
	SPHAEROCYSTIS	6
07/10/1996	DINOBRYON	37
	ASTERIONELLA	30
	TABELLARIA	12
07/24/1997	TABELLARIA	39
	DINOBRYON	23
	ANABAENA	16
07/08/1998	ASTERIONELLA	24
	DICTYOSPHAERIUM	22
	DINOBRYON	15
07/15/1999	TABELLARIA	26
	STAURASTRUM	18
	DINOBRYON	15

Table 2.

CANAAN STREET LAKE

CANAAN

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07/17/2000	SYNURA	89
	CHRYSOSPHAERELLA	5
	DINOBRYON	3

Table 3.

CANAAN STREET LAKE

CANAAN

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1988	5.0	5.4	5.2
1989	5.8	5.8	5.8
1990	4.0	4.0	4.0
1991	4.0	4.0	4.0
1992	3.3	3.3	3.3
1993	4.8	4.8	4.8
1994	4.4	4.4	4.4
1995	3.9	3.9	3.9
1996	3.7	3.7	3.7
1997	3.5	3.5	3.5
1998	4.2	4.2	4.2
1999	6.3	6.3	6.3
2000	3.7	3.7	3.7

Table 4.

CANAAN STREET LAKE

CANAAN

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1988	6.94	7.13	7.02
	1989	7.13	7.46	7.26
	1990	7.24	7.24	7.24
	1991	7.22	7.37	7.29
	1992	7.27	7.37	7.32
	1993	7.15	7.15	7.15
	1994	7.10	7.10	7.10
	1995	7.10	7.10	7.10
	1996	6.89	6.89	6.89
	1997	7.28	7.28	7.28
	1998	6.96	6.96	6.96
	1999	6.94	6.94	6.94
	2000	6.93	6.93	6.93
FLEENAIN INLET				
	1992	7.53	7.53	7.53
HYPOLIMNION				
	1988	6.10	7.14	6.36
	1989	7.20	7.37	7.28
	1990	7.24	7.24	7.24
	1991	7.08	7.12	7.10
	1992	7.11	7.33	7.21
	1993	7.14	7.14	7.14
	1994	7.07	7.07	7.07
	1995	7.08	7.08	7.08
	1996	6.74	6.74	6.74

Table 4.

CANAAN STREET LAKE

CANAAN

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1997	7.21	7.21	7.21
	1998	6.73	6.73	6.73
	1999	6.96	6.96	6.96
	2000	6.91	6.91	6.91
INLET				
	1988	6.48	7.14	6.70
	1989	7.38	7.38	7.38
	1991	7.17	7.41	7.27
	1992	7.09	7.10	7.10
	1993	7.10	7.10	7.10
	1994	6.56	6.56	6.56
	1995	7.11	7.11	7.11
	1996	6.36	6.36	6.36
	1997	6.62	6.62	6.62
	1998	6.47	6.47	6.47
	2000	6.59	6.59	6.59
OUTLET				
	1988	6.47	6.98	6.65
	1989	7.02	7.02	7.02
	1991	6.89	7.12	6.99
	1992	7.08	7.29	7.17
	1993	6.75	6.75	6.75
	1994	7.05	7.05	7.05
	1995	6.56	6.56	6.56
	1996	6.69	6.69	6.69
	1997	7.00	7.00	7.00
	1998	6.74	6.74	6.74
	1999	6.75	6.75	6.75

Table 4.

CANAAN STREET LAKE

CANAAN

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
OUTLET				
	2000	6.59	6.59	6.59

Table 5.

CANAAN STREET LAKE

CANAAN

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1988	10.50	11.40	10.95
1989	8.80	9.40	9.10
1990	9.90	9.90	9.90
1991	10.20	10.20	10.20
1992	10.40	10.60	10.50
1993	8.60	8.60	8.60
1994	9.40	9.40	9.40
1995	9.50	9.50	9.50
1996	8.30	8.30	8.30
1997	8.80	8.80	8.80
1998	6.50	6.50	6.50
1999	9.30	9.30	9.30
2000	9.20	9.20	9.20

Table 6.

CANAAN STREET LAKE
CANAAN

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1988	47.9	48.1	48.0
	1989	52.3	54.6	53.4
	1990	53.0	53.0	53.0
	1991	54.4	56.6	55.5
	1992	55.8	56.9	56.3
	1993	55.5	55.5	55.5
	1994	57.8	57.8	57.8
	1995	58.2	58.2	58.2
	1996	58.3	58.3	58.3
	1997	55.2	55.2	55.2
	1998	54.2	54.2	54.2
	1999	63.1	63.1	63.1
	2000	64.3	64.3	64.3
FLEENAIN INLET				
	1992	55.6	55.6	55.6
HYPOLIMNION				
	1988	47.7	48.2	47.9
	1989	51.2	54.2	52.7
	1990	53.7	53.7	53.7
	1991	53.6	55.2	54.4
	1992	54.8	57.5	56.1
	1993	55.1	55.1	55.1
	1994	56.8	56.8	56.8
	1995	58.1	58.1	58.1
	1996	58.2	58.2	58.2

Table 6.

CANAAN STREET LAKE

CANAAN

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1997	54.5	54.5	54.5
	1998	55.5	55.5	55.5
	1999	63.0	63.0	63.0
	2000	64.3	64.3	64.3
INLET				
	1988	55.6	56.6	56.1
	1989	63.4	63.4	63.4
	1991	54.4	57.5	55.9
	1992	54.8	55.8	55.3
	1993	56.1	56.1	56.1
	1994	59.0	59.0	59.0
	1995	58.6	58.6	58.6
	1996	60.0	60.0	60.0
	1997	54.1	54.1	54.1
	1998	56.5	56.5	56.5
	2000	62.1	62.1	62.1
OUTLET				
	1988	53.3	60.1	56.7
	1989	66.6	66.6	66.6
	1991	56.6	57.8	57.2
	1992	55.1	57.5	56.3
	1993	62.9	62.9	62.9
	1994	60.8	60.8	60.8
	1995	63.3	63.3	63.3
	1996	62.9	62.9	62.9
	1997	58.3	58.3	58.3
	1998	57.4	57.4	57.4

Table 6.

CANAAN STREET LAKE
CANAAN

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1999	66.8	66.8	66.8
	2000	71.4	71.4	71.4

Table 8.

CANAAN STREET LAKE

CANAAN

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1988	1	8	4
	1989	8	12	10
	1990	9	9	9
	1991	9	11	10
	1992	9	10	9
	1993	5	5	5
	1994	6	6	6
	1995	7	7	7
	1996	7	7	7
	1997	16	16	16
	1998	7	7	7
	1999	4	4	4
	2000	6	6	6
FLEENAIN INLET				
	1992	13	13	13
HYPOLIMNION				
	1988	5	12	8
	1989	9	12	10
	1990	10	10	10
	1991	10	11	10
	1992	11	11	11
	1993	5	5	5
	1994	7	7	7
	1995	8	8	8
	1996	10	10	10

Table 8.

CANAAN STREET LAKE

CANAAN

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1997	13	13	13
	1998	8	8	8
	1999	7	7	7
	2000	< 5	5	5
INLET				
	1988	2	17	9
	1989	8	40	24
	1991	9	12	10
	1992	8	11	9
	1993	4	4	4
	1994	145	145	145
	1995	5	5	5
	1996	14	14	14
	1997	11	11	11
	1998	8	8	8
	2000	33	33	33
OUTLET				
	1988	2	16	9
	1989	22	26	24
	1991	11	15	13
	1992	9	12	10
	1993	13	13	13
	1994	13	13	13
	1995	8	8	8
	1996	11	11	11
	1997	15	15	15
	1998	8	8	8

Table 8.

CANAAN STREET LAKE

CANAAN

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1999	10	10	10
	2000	10	10	10

Table 9.

CANAAN STREET LAKE

CANAAN

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		July 17, 2000	
0.1	21.2	7.7	86.8
1.0	21.2	7.7	87.1
2.0	21.2	7.7	86.9
3.0	21.2	7.8	87.5
4.0	21.2	7.7	86.9
5.0	21.0	7.3	82.1
5.5	20.5	6.0	66.7

Table 10.

CANAAN STREET LAKE

CANAAN

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 20, 1988	6.0	20.2	6.6	72.0
July 13, 1989	6.0	18.6	8.7	90.0
July 19, 1990	6.0	18.9	0.3	3.2
July 29, 1991	5.5	22.0	1.9	21.9
August 3, 1992	6.0	19.5	6.9	75.5
September 8, 1993	6.0	21.2	7.7	85.0
August 10, 1994	5.5	21.6	8.7	96.0
July 19, 1995	6.0	21.9	7.3	81.0
July 10, 1996	6.0	18.5	6.4	67.0
July 24, 1997	6.0	20.0	3.9	42.0
July 8, 1998	6.0	17.6	3.5	36.0
July 15, 1999	6.0	21.8	6.2	70.3
July 17, 2000	5.5	20.5	6.0	66.7

Table 11.

CANAAN STREET LAKE

CANAAN

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	0.3	0.3	0.3
	1998	0.3	0.3	0.3
	1999	0.3	0.3	0.3
	2000	0.3	0.3	0.3
HYPOLIMNION				
	1997	0.4	0.4	0.4
	1998	0.6	0.6	0.6
	1999	0.4	0.4	0.4
	2000	0.4	0.4	0.4
INLET				
	1997	0.3	0.3	0.3
	1998	0.6	0.6	0.6
	2000	1.6	1.6	1.6
OUTLET				
	1997	0.4	0.4	0.4
	1998	0.3	0.3	0.3
	1999	0.9	0.9	0.9
	2000	0.8	0.8	0.8